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EXAMINER

HON, SOW FUN

ART UNIT

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/567,552	<b>Applicant(s)</b> HARDING ET AL.	
	<b>Examiner</b> SOPHIE HON	<b>Art Unit</b> 1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. ____.                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>2/08/06</u> .   | 6) <input type="checkbox"/> Other: ____.                          |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 1-21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a. In independent claim 1, it is unclear as to whether the qualifying term of "monomeric, oligomeric or polymeric" means that the reactive mesogen RM can be a moiety that is attached to the resin that forms the matrix of the alignment layer, and is a single monomeric unit, oligomeric unit or polymeric unit, as well as being an entity that is physically separate from the resin that forms the matrix of the alignment layer. Dependent claim 3, which further recites that the reactive mesogen is present in monomeric or oligomeric form in the alignment layer *after its preparation*, appears to confirm that the recitation in claim 1, which is the broader claim, being the parent claim, does indeed encompass the case where the reactive mesogen RM is a moiety that is attached to the resin that forms the matrix of the alignment layer, as a single monomeric unit, oligomeric unit or polymeric unit. Clarification is requested and an amendment is suggested in accordance with the language of the specification. For the purposes of examination, the claims will be treated in light of the broader interpretation.

b. In claim 6, it is unclear how the alignment layer *is* a polyimide film if it comprises reactive mesogens as recited in parent claim 1, unless the reactive mesogens are

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physically attached to the polyimide. An amendment is suggested in accordance with the language of the specification (e.g. insertion of a qualifying phrase such as “comprising the at least one reactive mesogen (RM)”.

c. In claim 7, it is unclear whether general formula A of Applicant designates a repeat unit of the polyimide film, which is normally represented by the chemical structure enclosed in brackets with the subscript "n". Clarification is requested and an amendment is suggested in accordance with the language of the specification (e.g. insertion of a qualifying phrase such as “comprising the at least one reactive mesogen (RM)”. For the purposes of examination, general formula A of Applicant will be interpreted as a repeat unit of a polyimide film.

c. In claim 9, it is unclear how the alignment layer *is* a triacetate cellulose or diacetate cellulose film if it comprises reactive mesogens as recited in parent claim 1 unless the reactive mesogens are physically attached to the cellulose. An amendment is suggested in accordance with the language of the specification (e.g. insertion of a qualifying phrase such as “comprising the at least one reactive mesogen (RM)”.

d. In claim 13, it is unclear how the alignment layer *is* a TAC or DAC film if it comprises reactive mesogens as recited in claim 1 unless the reactive mesogens are physically attached to the cellulose. An amendment is suggested in accordance with the language of the specification (e.g. insertion of a qualifying phrase such as “comprising the at least one reactive mesogen (RM)”.

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Furthermore, claim 13 appears to recite specific species of the compounds listed in claim 12. The use of multiple "L<sup>1</sup>" designations in claim 12 and the "L<sup>1</sup>" and "L<sup>2</sup>" designations in claim 13 is inconsistent and thus confusing.

e. Claim 14 contains the recitation of "precursor material" which lacks antecedent basis in parent claim 1. Furthermore, it is unclear as to what the material is a precursor of. In any event, it is also unclear as to whether the term "precursor material" was intended to be present in parent claim 1. Both clarification and amendment are required.

f. Claim 16 provides for the use of an alignment layer, and claim 19 provides for the use of a precursor material, alignment layer or laminate, but, since the claims do not set forth any steps involved in the methods/processes, it is unclear what methods/processes Applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced. Furthermore, the recitations of "substrate" in claim 16 and "precursor material" and "laminate" in claim 19, all lack antecedent basis in parent claim 1.

### ***Claim Rejections - 35 USC § 101***

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

2. Claims 16, 19 are rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper

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definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd. v. Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 5-7, 16, 19-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Yoshioka (US 5,000,545).

Regarding claims, 1, 6-7, 16, Yoshioka teaches an alignment layer used to align liquid crystal (LC) molecules (alignment control layer film for controlling the alignment state of liquid crystal, column 3, lines 1-10) characterized in that it is a polyimide film of Applicant's general formula A in terms of repeat units (dehydrocondensation product of pyromellitic acid dianhydride and 4,4'-diaminodiphenyl ether, column 4, lines 23-28), which, since the alignment layer of claim 7 is a species of the alignment layer of claim 1,

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is defined by Applicant's specification as being an alignment layer that comprises at least one reactive mesogen in polymeric form (original claims 1, 7).

Regarding claim 5, Yoshioka teaches that the alignment layer is a solvent processed film (solution, column 4, lines 23-28).

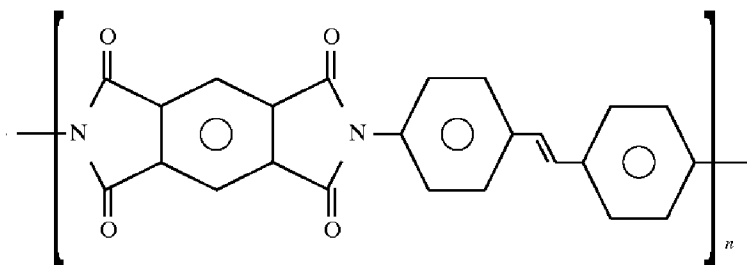
Regarding claims 19-21, Yoshioka teaches that the alignment layer is disposed in a liquid crystal display device (panel, column 1, lines 10-15) which is an electrooptical application.

4. Claims 1, 3-4, 6, 15-16, 19-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Gass (US 5,808,716).

Regarding claims 1, 3-4, 16, Gass teaches an alignment layer used for aligning liquid crystal (LC) molecules (column 5, lines 1-10), characterized in that it comprises at least one reactive mesogen (RM) in polymeric form obtainable from a precursor material comprising at least one reactive mesogen (RM) (alignment layer containing olefin group, 4,4'-diaminostilbene residue on right side of polyimide repeat unit, column 6, lines 26-36). Gass teaches that the polyimide layer is contacted with reactive mesogens in monomeric form (LC molecule containing ketone group, column 5, lines 20-40) some of which would be absorbed into the polyimide layer during the preparation of the alignment layer.

Regarding claim 6, Gass teaches that the alignment film matrix is a polyimide film matrix (column 6, lines 26-36) as shown on the next page.

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Regarding claim 15, Gass teaches that the alignment layer is obtainable from a polymeric precursor material comprising at least one reactive mesogen (alignment layer containing olefin group, 4,4'-diaminostilbene residue on right side of polyimide repeat unit, column 6, lines 26-36).

Regarding claims 19-21, Gass teaches that the alignment layer is disposed in a liquid crystal display device (column 4, lines 17-22) which is an electrooptical application.

5. Claims 1-2, 4-6, 8, 10-11, 15-16, 19-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Ichimura (US 6,001,277).

Regarding claims 1-2, 4, 16, Ichimura teaches an alignment layer used for aligning liquid crystal (LC) molecules (abstract), characterized in that it comprises 25% by weight of one reactive mesogen (RM) in polymeric form obtainable from a precursor material comprising the reactive mesogen (polyamic acid, 2.15 g of 1-(2,4-diaminophenoxy)-2-[4-(phenylazo)phenoxy]-ethane, column 38, lines 15-25), which is within the claimed range of less than 50%.

Regarding claim 5, Ichimura teaches that it is a solvent processed film (dissolved, solution obtained was spin-coated, column 45, lines 60-65).



Regarding claim 6, Ichimura teaches that the alignment layer matrix can be a polyimide film matrix (column 27, lines 35-41).

Regarding claim 8, Ichimura teaches that the alignment layer matrix can be a cellulose based film matrix (column 7, lines 25-32) that is solvent processed (dissolved, solution obtained was spin-coated, column 45, lines 60-65).

Regarding claims 10-11, Ichimura teaches that the alignment layer comprises isomerisable azobenzene (1-(2,4-diaminophenoxy)-2-[4-(phenylazo)phenoxy]-ethane, column 38, lines 15-25) which renders said alignment layer a command layer wherein changes in the orientational direction of the azobenzene induce a specific alignment of an LC material coated onto said alignment layer.

Regarding claim 15, Ichimura teaches that the alignment layer is obtainable from a polymeric precursor material comprising at least one reactive mesogen (4-(2-methacryloyloxyethoxy)azobenzene, column 36, lines 60-65, polymer, column 36, lines 1-5).

Regarding claims 19-21, Ichimura teaches that the alignment layer is disposed in a liquid crystal display device (abstract) which is an electrooptical application.

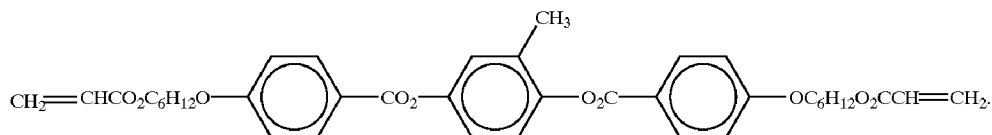
6. Claims 1, 4-5, 12, 15-16, 19-21 are rejected under 35 U.S.C. 102(b) as being anticipated by O'Neill (US 2003/0021913 A1).

Regarding claims 1, 4, 12, 16, O'Neill teaches an alignment layer for aligning liquid crystal (LC) molecules ([0002]), characterized in that it comprises a reactive mesogen in monomeric form (reactive liquid crystal formed from a reactive mesogen, Compound 4, [0025]) represented by formula II of Applicant where  $P^1$  of Applicant =  $P^2$

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of Applicant = polymerizable group  $\text{CH}_2=\text{CHCO}_2^-$ , x of Applicant = y of Applicant = 6,  $g^1$  of Applicant =  $g^2$  of Applicant =  $-\text{O}-$ ,  $L^1$  of Applicant =  $L^2$  of Applicant =  $L^3$  of Applicant =  $L^5$  of Applicant =  $L^6$  of Applicant = H,  $L^4$  of Applicant = an alkyl group with 1 C atom,  $Z^3$  of Applicant =  $-\text{COO}-$  and  $Z^4$  of Applicant =  $-\text{OCO}-$  (Compound 4, [0025]), and more specifically, formula Ia of Applicant, where  $P^1$  of Applicant =  $P^2$  of Applicant = polymerizable group  $\text{CH}_2=\text{CHCO}_2^-$ , x of Applicant = y of Applicant = 6,  $L^1$  of Applicant = H and  $L^2$  of Applicant =  $\text{CH}_3$  = an alkyl group with 1 C atom.  $-\text{O}_2\text{C}-$  of O'Neill is an alternate representation of Applicant's linking group of  $-\text{OCO}-$ .

(Compound 4)



Regarding claim 5, O'Neill teaches that the alignment layer is characterized in that it is coated onto a substrate and dried ([0026]) which implies that it is coated from solution since it requires drying to remove the solvent, and is hence a solvent processed film.

Regarding claim 15, O'Neill teaches that this precursor material comprising at least one reactive mesogen can be a polymer precursor ([0024]).

Regarding claims 19-21, O'Neill teaches that the alignment layer is disposed in a liquid crystal display device ([0002-0005]) which is an electrooptical application.

7. Claims 1, 4-5, 8, 19-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Nam (US 6,764,724).

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Regarding claims 1, 4-5, 8, Nam teaches an alignment layer for aligning liquid crystal (LC) molecules (column 8, lines 64-67) that comprises at least one reactive mesogen in monomeric form obtainable from a precursor material comprising at least one reactive mesogen (functional group R includes, column 7, lines 1-20, cinnamoyl derivative (column 7, lines 29-36), characterized in that it is a cellulose based film (hydroxyethylcellulose cinnamate, column 4, lines 1-10) that is solvent processed (solution, column 4, lines 23-30).

Regarding claims 19-21, Nam teaches that the alignment layer is disposed in a liquid crystal display device (abstract) which is an electrooptical application.

8. Claims 1, 6, 10-11, 16, 19-21 are rejected under 35 U.S.C. 102(e) as being anticipated by Kumar (US 6,939,587).

Regarding claims 1, 16, Kumar teaches an alignment layer used for aligning liquid crystal (LC) (alignment of the liquid crystal without a separate alignment layer at the interface, column 8, lines 24-26) characterized in that it comprises at least one reactive mesogen (RM) in monomeric form (mixture of reactive liquid crystal monomer, a photomonomer and a polyimide, column 8, lines 8-26).

Regarding claim 6, Kumar teaches that the alignment layer matrix is characterized in that it is a polyimide film matrix (mixture of reactive liquid crystal monomer, a photomonomer and a polyimide, column 8, lines 8-26).

Regarding claims 10-11, Kumar teaches that the alignment layer can be a command layer comprising azobenzene, stilbene, cinnamate, chalcone, coumarin compounds (stilbenzene, polyimide with chromophores, column 7, lines 53-60).

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Regarding claims 19-21, Kumar teaches that the alignment layer is used in an electrooptical application such as in a liquid crystal display device (column 11, lines 20-25-35, display, column 3, lines 20-25).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 5, 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gass as applied to claims 1, 3-4, 6, 15-16, 19-21 above.

Gass teaches the alignment layer characterized in that it comprises at least one reactive mesogen in polymeric form and one reactive mesogen in monomeric form, as described above.

Regarding claim 5, Gass teaches that the alignment film is coated onto surfaces (column 5, lines 19-21) whereby a thin film coating is ordinarily achieved by solvent processing, as is well known in the art.

Regarding claims 17-18, Gass fails to teach in the same embodiment, a laminate comprising the alignment layer described above, and a film comprising polymerised and/or crosslinked LC material, and thus also fails to teach a method of preparing said laminate.

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However, Gass teaches a laminate comprising an alignment layer of a separate embodiment and a film comprising polymerised and/or crosslinked LC material, for the purpose of stabilizing the layers in the bulk of the FLC layer to enhance resistance to mechanical damage (network structure may also be formed in the bulk of the FLC layer because of bonding between reactive mesogens, column 5, lines 10-16), where the method of preparing the laminate comprises the step of providing a layer of polymerizable LC material onto an alignment layer and aligning the LC material into uniform orientation (filling the cell with the FLC material, the smectic structure is aligned, column 5, lines 1-5) followed by the step of polymerizing or crosslinking the LC material (network structure may also be formed in the bulk of the FLC layer because of bonding between reactive mesogens, column 5, lines 10-16).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have prepared a laminate by a method that comprises the step of providing a layer of polymerizable LC material onto an alignment layer and aligning the LC material into uniform orientation followed by the step of polymerizing or crosslinking the LC material, to prepare a laminate comprising the alignment layer characterized in that it comprises at least one reactive mesogen in polymeric form, and a film comprising the LC material that is polymerised and/or crosslinked, in order to obtain enhanced resistance to mechanical damage, as taught by Gass.

10. Claims 7, 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ichimura as applied to claims 1-2, 4-6, 8, 10-11, 15-16, 19-21 above.

Ichimura teaches the alignment layer characterized in that it comprises at least one reactive mesogen in polymeric form, as described above.

Regarding claim 7, Ichimura teaches that the alignment layer matrix can be a polyimide film matrix as described above, but fails to teach in the examples that the polyimide film matrix has the general formula A of Applicant.

However, Ichimura teaches within the body of the specification that the polyimide film matrix can be formed with pyromellitic dianhydride (column 27, lines 40-45) as one of the dianhydride reactants, and 4,4'-diaminodiphenyl ether (column 29, lines 20-25) as one of the corresponding diamine reactants, wherein the dianhydride and the diamine react in the well known condensation reaction to form the imide precursor followed by ring-closure of the imide precursor to yield the imide repeat unit of Applicant's general formula A, for the purpose of providing the desired alignment properties.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have provided a repeat unit in the polyimide film matrix of Ichimura, with one of Applicant's general formula A, in order to obtain the desired alignment properties, as taught by Ichimura.

Regarding claim 9, Ichimura teaches that the alignment layer matrix can be a cellulose based film matrix as described above. In addition, Ichimura teaches acetyl cellulose as a more specific type, of which triacetate cellulose and diacetate cellulose are the most common and hence the most obvious species for one of ordinary skill in the art to have used as the cellulose based alignment film of Ichimura.

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11. Claims 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over O'Neill as applied to claims 1, 4-5, 12, 15-16, 19-21 above.

O'Neill teaches the alignment layer characterized in that it comprises at least one reactive mesogen in monomeric form, as described above.

Regarding claims 10-11, O'Neill fails to teach in the same embodiment that the alignment layer is a command layer comprising chromophore compounds such as a cinnamate or a coumarin.

However, O'Neill teaches in the body of the specification that the alignment layer can be made into a command layer comprising a cinnamate or a coumarin compound (chromophore, [0012]), for the purpose of providing the desired photoalignability.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have made the alignment layer of O'Neill into a command layer comprising a cinnamate or a coumarin chromophore compound, in order to obtain the desired photoalignability, as taught by O'Neill.

Any inquiry concerning this communication should be directed to Sow-Fun Hon whose telephone number (571)272-1492. The examiner can normally be reached Monday to Friday from 10:00 AM to 6:00 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Keith Hendricks, can be reached on (571)272-1401. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*/Sophie Hon/*

Sow-Fun Hon

/Carol Chaney/

Supervisory Patent Examiner, Art Unit 1794